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to the state of the most fertile fields of that country.

Our American inundated lands are divisible into several classes, determined by the condition of their origin. Of these, the most important are the tide-water marshes, the lacustrine swamps of the glaciated district, the delta swamps of the Mississippi, and the class of wet lands or upland swamps where the marshy condition is due to the action of plants in retaining water under the surfaces of considerable districts. The formation of the sponge-like sphagnum-peat has been well described; but it is evident that a very large part of the southern swamps of the United States are essentially climbing bogs, though the retention of the moisture is due, not, as in the north, to the mosses, but to the close-growing, flowering plants, principally to the common cane.

Preliminary studies of the great area of fresh-water marshes, extending from the mouth of the James River to the south of Albemarle Sound, show, that, in that district, this class of marshes covers an area of about four thousand square miles. Throughout this district the peaty deposit is generally thin, not usually exceeding four feet in thickness, thus permitting the roots of the trees to force their way to the subsoil below the decaying vegetable matter.

The surface of the swamp, as well as the substratum on which it rests, is generally inclined towards the natural drainage of the country to the amount of two feet to the mile. The water is retained by the dense mat of stems, roots, and decaying fragments of plants, which are so closely interlaced that the friction in the interstices prevents the speedy outflow of the rainfall.

This class of marshes can be easily and cheaply drained, and, when so improved, they afford exceedingly rich soils. Along the outer margins of these vast morasses, some hundred thousand acres have been won to culture. These lands are remarkably fertile; and I am told that they often yield fifty bushels of shelled maize to the acre, and that they endure tillage for a period of many years without fertilizing.

It seems likely that of these easily reclaimed upland morasses, resembling the Dismal Swamp, there is a total area, in the southern states, of not less than twenty-five thousand square miles. To these might be added the lands which are subject to serious inundations from rivers, which probably amount to something like eight thousand square miles.

In the northern states the area of improvable swamp-land is less extensive, but there is not a state in which they do not constitute an important part of the land-reserve which the coming

generation will be glad to use. It is easy to see, that, in these inundated lands of the United States, we may find fields which will give a larger return to the husbandman than those now tilled in any state of the union; and, furthermore, that, with the rapid increase in our population, it is none too soon for us to be considering the aspects of this portion of our domain. It is clear that the national survey can, by a proper study of these swamp-districts of the country, so determine their condition as to prepare the way for the engineer. The aim will be to ascertain their extent, the conditions determining their value for tillage, and the best method of approaching the economic questions which they present. Even where these swamps may be unprofitable for agricultural use, it may often be found that they are admirably adapted for timber-culture. The juniper (*Cupressus thyoides*) and the bald cypress (*Taxodium disticum*) are particularly suited to this form of forest-culture.

The scientific aspects of the American swamps, their relation to the changes of level of the continent, the ways in which their deposits were accumulated, cannot be considered in this place. My aim at present is to call attention to the great economic importance of this field of inquiry.

N. S. SHALER.

#### GEOGRAPHICAL NOTES.

**Russian Lapland.**—Charles Rabot, during the past summer, obtained interesting details on the Kola peninsula, which lies westward from the White Sea and between it and the Arctic Ocean, in Russian Lapland. This region is very little known, and large blanks occur in the best charts. The country is rather monotonous, covered with forests, and dotted with lakes, some of which attain a large size. Imandra is a hundred and forty kilometres broad, surrounded by grand scenery, and hemmed in by two mountain-chains, which reach about three thousand feet in height, Umbdek, on the east, being a little the higher. There are no glaciers, but permanent snow exists on the peaks. After the Caucasus, this region contains the highest elevations of European Russia, and presents a desolate, barren, and impressive aspect. The lakes are very shallow: the greatest depth of Imandra does not exceed fifteen or eighteen feet, from which it shoals to a few inches. It contains many wooded islets. From this lake the explorer went to the Arctic shores, and crossed the unexplored region which extends westward from the lake. Here, where the maps indicate a flat country, he found a rugged region, bristling with mountains exceeding three thousand feet in height.

Between the White Sea and the Arctic Ocean the traveller found three series of ranges, separated by depressions covered with forests, marshes, and lakes. The Russian Lapps were well-made people, averaging over five feet in height. The people and officials everywhere gave him every assistance.

**Precursors of Columbus.** — Prof. Guido Cora reviews 'The precursors of Columbus' in a late number of the bulletin of the Italian geographical society. After an interesting *résumé*, he concludes that to Columbus is unquestionably due the opening of a new world to humanity as represented by civilized races; that the name of America is derived from some aboriginal word picked up by the companions of Columbus; that the precursors of Columbus, in their voyages toward America, were merely in search of wealth or prompted by a spirit of adventure, and not instigated by scientific prevision or the result of study of probabilities; that it is certain that the Scandinavians, Basques, and probably also the Irish, had reached American shores before Columbus; while to the brothers Zeno are due important charts and documents from which the previous discovery of America might be inferred.

**Poliakoff's 'Journey in Sakhalin.'** — A translation of Poliakoff's 'Journey in Sakhalin in 1881-82' has been made by Professor Arzruni, and published by Asher & Co. This forms a sort of monograph of the products, industries, and people of this little-known island, and is well worthy the attention of ethnologists and geographers. It contains especially rich contributions to the anthropology, mineral products, fisheries, and geography. The Ainos, who inhabit the southern portion, are exhaustively treated of. As the original documents are largely in Russian, this may be said to be for most students the first effective publication of the material.

**Pilcomayo expedition to Bolivia.** — Some news has been received from the latest expedition of M. Thouar, who is endeavoring to find a trade-route, *via* the Pilcomayo, between Bolivia and the Argentine states. He left Assumption Sept. 28, with an escort of twenty-eight experienced soldiers, two months' provisions, and a sufficient number of horses, mules, etc. A volunteer, Mr. Wilfrid Gilbert, accompanied the party. Major Feilberg, as mentioned by us at the time, recently ascended the river by water, finding a minimum of six feet of water in the channel up to Lambara, a point two hundred and fifty-five miles from the mouth of the Pilcomayo. Here the party was arrested by the rapids, over which there were not more than two feet of water, rendering navigation impossible, and deciding the return of the expedition. Since then an Argentine column, com-

manded by Captain Gomenzorro, has raided the borders of the river, killed or routed the people of the Toba tribe, living on its banks, and brought back a good deal of plunder and a few prisoners. Defeats of this kind, however, have not hitherto had much effect on the Tobas, beyond causing them to retreat temporarily into their jungles. They have avenged, as in the case of Crevaux, on other white men, the destruction visited on their villages. With this unpromising state of things, Thouar's plan of ascending the river by land, with the above-mentioned small escort, for the purpose of investigating the rapids and determining whether any improvement of the river at that point is possible, seems almost foolhardy; and it is to be regretted that the counsel of those who advised an expedition by water was not adopted.

#### LONDON LETTER.

THE University of Cambridge has just suffered a severe loss by the death of its librarian, Mr. Henry Bradshaw, senior fellow of King's college. The present efficiency of the university library is almost entirely due to his untiring efforts during the many years that he was at its head. His bibliographical investigations were remarkable for their accuracy, and were carried out with a truly scientific precision, while he took a special interest in that department of his duties which was connected with the literature of systematic zoölogy. Others will follow him in the post of university librarian; but it is not given to many men to be so truly mourned as Mr. Bradshaw is by the many generations of Cambridge men who knew and loved him. The terms of the university statutes require that the post shall be filled within a fortnight of its becoming vacant; and it is probable that the choice of the electors will fall upon Prof. W. Robertson Smith, the editor of the 'Encyclopaedia Britannica,' who is so well known in the subject of Old-Testament criticism. He is a fellow of Christ's college, and lord-almoner's reader in Arabic to the university.

The school of engineering at Cambridge has been making considerable progress of late years under the direction of Prof. James Stuart, M. P. for Hackney; and it is now proposed to institute a tripos examination in engineering, which should be combined to some extent with the natural sciences tripos, and would include a very considerable amount of practical work, together with some of the higher branches of mathematics.

Honor candidates who find a difficulty in mathematics need no longer be troubled with them among the 'additional subjects' of the previous